Student Name:
School Name:
Teacher/Class:

Montana Comprehensive Assessment System (MontCAS, Phase 2 CRT)

Grade 8
Common Released Items
Spring 2008

OPI

OFFICE OF PUBLIC INSTRUCTION

SECURE MATERIALS. MAY NOT BE DUPLICATED.

General Directions

This test contains nine sessions: three in reading, three in mathematics, and three in science. The sessions are made up of multiple-choice questions and questions for which you must show your work or write out your answers. Write your answers to all of the questions in your Student Response Booklet. For the reading parts of the test, read each selection before answering the questions.

For each multiple-choice question, choose the best answer. Fill in the bubble in your Student Response Booklet that corresponds to your answer choice for that question.

Some questions ask you to show your work or to write out your answers. Write your answers to these questions in the spaces provided in your Student Response Booklet. Your answers must fit in the spaces provided. Any part of an answer outside the box might not be scored.

Be sure to answer all parts of each question, and to answer completely. For example, if a question asks you to explain your reasoning or show your work, be sure to do so. You can receive points for a partially correct answer, so try to answer every question.

Reading
Session 1

This test session includes a reading selection and multiple-choice questions. After you read the selection, answer the questions about it in the spaces provided in your Student Response Booklet. You may not use a dictionary or any other reference tool during this session.

Read this article about how to make a solar oven. Then answer the questions that follow.

Solar Oven Science

Patricia D. Lock

Think about getting into a closed car on a sunny day. Outside may be only 70 degrees F, but inside temperatures can reach above 200 degrees F. Your car has turned into a solar oven! This happens because glass and clear plastic allow light energy to pass through but the heat energy produced by it cannot exit. Solar panels work in a similar way. When light energy hits the solar cell material, instead of being converted into heat, it is converted into electricity. In the United States, solar ovens are popular with campers and naturalists. Around the world, solar cookers are used in developing countries because solar oven cooking is cheap, pollution free, and easier than cooking over a fire. You, too, can build a solar oven. Just follow these directions.

You Need:

- a box at least 12" x 18" x 9", preferably one with a lift-off lid (the kind used for copier paper)
- a box that will fit inside the larger box with 3" to 4" empty space all around it
- aluminum foil
- newspaper or packing "peanuts"
- plastic wrap
- clear tape, package tape
- scissors (box cutter optional)
- pencil and a ruler

To Make the Oven:

1. Cut the flaps off the top of the small box.
2. Line the small box with foil, shiny side facing in. Keep the foil as smooth as possible.
3. Place the small box into the larger box. As insulation, pack crumpled-up newspaper or the packing peanuts into the space around the small box.
4. Draw a rectangle the size of the top of the small box on the lid of the big box.
5. Cut along the lines of the two smaller sides of the rectangle and one of the longer sides (three sides total, and be very careful not to cut the fourth side).
6. Put the cut square up, folding along the fourth side to make a flap.
7. Line the inside of the flap with foil, keeping it smooth. This is your solar reflector, so the smoother the foil, the more energy will get into your oven.
8. Tightly tape the plastic wrap to the inside of the box lid, making a window.

Please go on to the next page.

9. Put the lid back on the box bottom, take it outside, and place it so that the flap catches sunlight and reflects it into the oven. A couple of clothespins clipped near the fold can help keep the angle right. Your solar oven is now ready to cook!

To Cook:

Try making nachos or s'mores. Using a dark pan will help the food cook faster. Can you figure out why? Later, you can also try making hot dogs, pizza, and even brownies. Just remember—with solar cooking, it takes about twice as long as cooking in a regular oven.

Patricia D. Lock, *an aerospace engineer with twenty years of experience, worked on remote-sensing missions, including* Galileo, Cassini, *and the* Spitzer Space Telescope.

Solar Oven

Please go on to the next page.

Mark your answers in the section marked "Reading—Session 1" in your Student Response Booklet.

1. In the first paragraph, the car comparison is **mostly** used to show

   A. why solar heat can be dangerous.
   B. some advantages of solar heat.
   C. how glass absorbs solar heat.
   D. how the energy of solar heat builds up.

2. When making a solar oven, what will **most likely** happen if a person does not make a window?

   A. The food will dry out.
   B. The box will get cold.
   C. The box will fall apart.
   D. The box will heat very little.

3. In the section titled "**You Need**," the word "peanuts" is in quotation marks because

   A. it emphasizes a different meaning of the word.
   B. it is a popular slang word.
   C. someone said it.
   D. readers may not know it.

4. This article is **most likely** organized by the sequence of steps in order to

   A. list the reasons for building solar ovens.
   B. help the reader solve problems when making a solar oven.
   C. help the reader learn how to properly assemble a solar oven.
   D. show that anyone with the correct materials can make a solar oven.

5. When making a solar oven, what should a person do **next** after making the flap?

   A. Try not to cut the fourth side.
   B. Pull the cut square up.
   C. Line the flap with foil.
   D. Tape the flap to the box.

6. Why does the author **most likely** suggest making nachos or s'mores?

   A. They are easy and fast.
   B. They need strong heat.
   C. They require only one pan.
   D. They are nutritious.

7. The **main** purpose of the information about the author at the end of this article is to show that she

   A. has written many articles.
   B. is an expert in her field.
   C. enjoys making solar ovens.
   D. has experience working with telescopes.

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Reading
Session 2

This test session includes a reading selection and multiple-choice questions. After you read the selection, answer the questions about it in the spaces provided in your Student Response Booklet. You may not use a dictionary or any other reference tool during this session.

Read this article about Shirley Ann Jackson. Then answer the questions that follow.

Aim for the Stars

Barbara Krasner-Khait

Shirley Ann Jackson

Her father once told her, "Aim for the stars, so that you can reach the treetops, and at least you'll get off the ground." Shirley Ann Jackson, president of Rensselaer Polytechnic Institute in Troy, New York, has used these words successfully throughout her life.

Jackson has achieved a steady stream of "firsts." She was the first African American woman to receive a doctorate from Massachusetts Institute of Technology (MIT) in any subject. She was also one of the first two African American women to receive a doctorate in physics. She was both
2 the first woman and the first African American to serve as chairman of the Nuclear Regulatory Commission (NRC). In 1999, she became the first African American woman to preside over a national research university. In February 2004, she became the president of the American Association for the Advancement of Science, the world's largest scientific society. She also has held senior positions in industry and research as a theoretical physicist at Bell Laboratories (now part of Lucent Technologies), and in academia as professor of theoretical physics at Rutgers University. It is no wonder that Jackson was named to the National Women's Hall of Fame in 1998 and named one of the Top 50 Women in Science by *Discover* magazine in 2002.

Her passion for science, knowledge, and achievement began by the time she was eight. "As I was growing up, I became fascinated with the notion that the physical world around me was a world of secrets," Jackson said. She decided to enter that world. "I recall one three-year period when I was fascinated with bees," she said. "During this time, I collected and experimented on live bees of all sorts—bumblebees, yellow jackets, and wasps. I adjusted their habitats, their diets, their exposure to light and heat, all the while keeping a detailed log of my observations of their behavior." She created her own laboratory under the back porch of her house.

Her parents and her teachers encouraged her. At Roosevelt High School in Washington, D.C., she took college level classes in math and biology and graduated as valedictorian of her class.

She arrived at MIT in 1964 and found herself alone. "I was cut out of study groups until people found out what I could do and that I was as serious as they were," Jackson said. One professor told
5 her, "Colored girls should learn a trade." Jackson decided her trade was physics. Inspired by the Rev. Dr. Martin Luther King, Jr., she pursued graduate work at MIT. She organized the Black

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Student Association and increased the number of minority students at MIT from two to fifty-seven in just one year.

At MIT and throughout her life, Jackson has found strength from her family, her church, her teachers, and her community. She has sought mentors and others from whom she could learn, believing that education multiplies options and opportunities in life.

She asks, "Why limit your possibilities in life when there is an exciting world out there waiting for your brainpower?" Heed the same advice she was given, and aim for the stars.

Mark your answers in the section marked "Reading—Session 2" in your Student Response Booklet.

35. In paragraph 2, the word academia is **most likely** derived from the word

    A. media.
    B. advancement.
    C. teachers.
    D. academy.

36. In paragraph 2, the facts about Shirley Ann Jackson are **most likely** included to

    A. describe her personality.
    B. emphasize the variety of her accomplishments.
    C. show how many people she inspired.
    D. prove she deserves to be in the National Women's Hall of Fame.

37. In paragraph 5, the author states that Jackson was "inspired by the Rev. Dr. Martin Luther King, Jr." **most likely** to show she was

    A. familiar with many of his accomplishments.
    B. motivated to follow his example.
    C. interested in learning more about him.
    D. determined not to repeat his mistakes.

38. Which statement **best** summarizes Jackson's accomplishments?

    A. She was a researcher at Bell Laboratories and a professor of theoretical physics at Rutgers University.
    B. She was a leader of the Nuclear Regulatory Commission and the American Association for the Advancement of Science.
    C. She was a physicist and professor, led organizations, and was named to the National Women's Hall of Fame.
    D. She was the first African American woman to receive a graduate degree from MIT.

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39. What is the **main** purpose of the last paragraph?

A. to inform about Jackson's inspirations
B. to provide an entertaining story about Jackson
C. to encourage readers to strive for their ambitions
D. to persuade readers that Jackson had a difficult life

40. Based on this article, which pair of words **best** describes Jackson?

A. ruthless and driven
B. determined and intelligent
C. insensitive and strong
D. sympathetic and aggressive

41. What is the **main** meaning of the phrase "aim for the stars"?

A. Try for a difficult goal.
B. Life goals are important.
C. Try to go someplace far away.
D. Science is a respectable profession.

Please STOP. Do not go on to the next page.

Reading
Session 3

This test session includes a reading selection, multiple-choice questions, and a question for which you must write out your answer. After you read the selection, answer the questions about it in the spaces provided in your Student Response Booklet. You may not use a dictionary or any other reference tool during this session.

Read this passage about a boy who learns to sing bird songs. Then answer the questions that follow.

Bird Songs

Jim Heynen

While others heard the train whistle, he heard the musical clicking of the wheels on rail joints. He heard the path of silence left behind the train. He heard the weeds lean from the whoosh of air. He heard the ripple in a stream. He heard little symphonies in the ice-bound twigs rattling in the wind. But mostly what the boy heard were the songs of birds. While others heard airplanes overhead, he heard the meadowlark far in the distance. When others heard traffic on the gravel road, he heard pigeons in the barn eaves. The good sounds of birds were a warm bath to him, calming him down and making him a good listener when grown-ups told him what to do.

Because bird songs were his favorite sounds, he spent hours listening to them. Alone and silent behind bushes or fences, he was their best audience. But the day came when listening was not enough, and he started answering the birds as best he could. He started at night when only the owl was singing. Hooting like an owl was as easy as playing a penny whistle, and the owl responded by answering back. During the day, he went on to the more difficult songs of other birds, and what he found with the owl was true with the other birds too: when he answered them, they answered back. To him, their answers sounded like applause.

Not all bird songs were easy, he soon learned, but he practiced long and hard. Everyone told him he was good at bird songs. The birds seemed to agree. They were a kind audience, sometimes fluttering by to get a closer look at him when he was finished with his little concerts.

Encouraged by his success, he expanded his repertoire. Crow sounds he mastered in a day, though his good ears had some trouble telling him that either the crow's or his own cawing fell in the good sound category. In less than a week he had the blue jay down. The staccato chirps of the sparrow came easy for him, as did the predictable repetitions of the chickadee. But then came the cheek- and lip-

4 tightening demands of the goldfinch and the air-swallowing gurgle of the pigeon. He went from bird to bird, changing the instruments of his fingers and lips and tongue to meet the challenge of each new audience. Sometimes a bird with high standards showed some signs of impatience with his imperfect renditions and, like a fussy choir director, repeated the song over and over in an effort to help him get it right.

Success at bird calling led to fantasies of larger audiences. Singing back to large flocks of ducks and geese seemed foolish, since he wanted to sound like a musician, not a hunter. He sought out huge flocks of starlings, but starlings lacked either patience or good taste and would flee at even his best imitations. He studied bird books and imagined traveling to exotic islands that were covered with colorful birds whose songs must be as varied and challenging as their colors. He was happy in his fantasies, but he had to live with the audience he could find on the farm.

He started roaming the fields, hoping to find every possible candidate: pheasants, quail, and what

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he could only think of as the little brown birds that fluttered in roadside ditches. Then, just when he felt he had exhausted both audience and repertoire, he had one terrible experience that changed everything. He had moved well beyond owl and crow, beyond sparrow and pigeon, beyond barn swallow and chickadee, and even beyond the complex riffs of the meadowlark and brown thrasher. But he made a mistake of wandering into the dark marshes of the red-winged blackbirds. He practiced for an entire mosquito-ridden afternoon and thought he had almost made an audience of the one he was imitating, when, with no warning, he was attacked from behind by a red-winged blackbird who lit into his hair like an eagle into a nest of field mice.

It was his first lesson in performing to an audience that did not like what it heard. Perhaps bored. Perhaps irritable. Perhaps threatened that he was upstaging them. He didn't stop making bird songs, but he could never put his fingers to his lips again without remembering that moment, no matter what his own good ears were telling him.

Mark your answers in the section marked "Reading—Session 3" in your Student Response Booklet.

69. In the first paragraph, why are the sounds of birds compared to a warm bath?

    A. to describe exactly what the boy hears
    B. to show that the boy listens to birds every day
    C. to compare them to noisy traffic
    D. to emphasize the comforting effect they have on the boy

70. In the first paragraph, what does the author establish about the boy?

    A. the kinds of bird calls he learns
    B. the conflict between him and the birds
    C. the ways he is different from other people
    D. the problems he has with sounding too much like animals

71. Which bird song does the boy learn **first**?

    A. the meadowlark's
    B. the pigeon's
    C. the owl's
    D. the crow's

72. In paragraph 4, the simile "like a fussy choir director" **mainly** suggests

    A. how the bird does not like the boy.
    B. the boy's thoughts about the bird.
    C. how the bird sounds to the boy.
    D. that the bird judges the boy's music.

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73. What causes the boy to think the birds like his bird calls?

A. They respond to his calls.
B. They appear to be friendly.
C. They do not fly away from him.
D. They listen to his calls.

74. Why does the boy think about going to an exotic island?

A. He could show off the bird calls he knows.
B. The island would have different birds than the farm.
C. He wants to live there with pet birds.
D. The island would have more activities than his town.

75. In the last paragraph, the author **most likely** uses the word candidate to suggest how

A. unusual the birds sound.
B. the boy is difficult to please.
C. real the boy's bird calls sound.
D. the boy selects which birds to mimic.

76. In the last paragraph, the comparison of the birds to an audience emphasizes **mainly** that the boy is

A. copying the birds.
B. bothering the birds.
C. performing for the birds.
D. friendly to the birds.

77. The information in this passage is given in chronological order so the reader sees

A. what the boy is feeling.
B. how the boy solves his problems.
C. the reasons for the events.
D. the events as they are happening.

78. In most of this passage, how do the sounds of birds make the boy feel?

A. peaceful
B. insecure
C. joyful
D. tense

Please go on to the next page.

79. What is the turning point in this passage?

A. The boy listens to the train whistle.
B. The boy learns to hoot like an owl.
C. The boy is attacked by a red-winged blackbird.
D. The boy continues making bird songs.

80. This passage is an example of

A. a fable.
B. an autobiography.
C. realistic fiction.
D. a persuasive essay.

Write your answer in the space provided for it in your Student Response Booklet.

81. Explain how the boy is able to improve his bird songs over time. Use information from the passage to support your answer.

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Mathematics
Session 1 (No Calculator)

This test session includes multiple-choice questions and questions for which you must show your work or write out your answer. You may NOT use a calculator during this session.

Mark your answers in the section marked "Mathematics—Session 1 (No Calculator)" in your Student Response Booklet.

2. Taylor buys plain hats for $2.50 each. He adds special designs and then resells the hats for 40% more than the price he paid for them. What is Taylor's selling price for the hats?

   A. $ 1.00
   B. $ 1.50
   C. $ 3.50
   D. $10.00

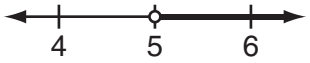
3. Which equation is equivalent to $\frac{2x}{3} + 4 = 10$?

   A. $2x = 18$
   B. $2x = 42$
   C. $x + 4 = 5$
   D. $x + 4 = 30$

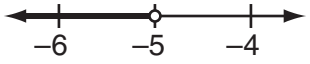
10. Study the inequality below.

$$3x + 26 < 11$$

Which graph represents the solution of this inequality?

A. 

B. 

C. 

D. 

13. One year, the budget for the United States government was 2.7 trillion dollars. Which expression shows 2.7 trillion written in scientific notation?

   A. 0.27×10^{13}
   B. 2.7×10^{10}
   C. 2.7×10^{12}
   D. 27×10^{11}

Please go on to the next page.

15. Chad is running laps around a track. The table below shows the number of laps he runs over time.

Chad's Running Rate

Time (minutes)	Total Number of Laps
2	5
4	10
12	30
18	45

If Chad runs laps at the same rate for another 28 minutes, how many **more** laps will he run?

A. 56
B. 60
C. 70
D. 115

16. Which equation is equivalent to $3(2x + 3) = 10$?

A. $(3 \cdot 2x) + 3 = 10$
B. $(3 \cdot 5)x = 10$
C. $(3 \cdot 2) + 3 \cdot (x + 3) = 10$
D. $(3 \cdot 2x) + (3 \cdot 3) = 10$

Please go on to the next page.

Write your answers in the spaces provided in your Student Response Booklet. Show all of your work.

19. Compute:

$$15\frac{2}{3} \div \frac{1}{6}$$

20. What is the value of the expression below when $p = 80$ and $h = 76$?

$$0.25p + h$$

Please go on to the next page.

Write your answer in the space provided for it in your Student Response Booklet. Show all of your work.

23. Sheryl compared these two formulas for making a dirt mix of peat moss and potting soil.

Formula 1	**Formula 2**
To make 5 cups of dirt mix: Mix 1 cup peat moss with 4 cups potting soil	To make 9 cups of dirt mix: Mix 2 cups peat moss with 7 cups potting soil

a. In Formula 1, what percent of the dirt mix is made with **potting soil**? Show or explain how you found your answer.

b. Determine which formula has the highest percentage of **peat moss**. Show or explain how you found your answer.

c. Sheryl needs 45 cups of dirt mix. She decides to use Formula 2. How many cups of **peat moss** does she need to make 45 cups of dirt mix? Show or explain how you found your answer.

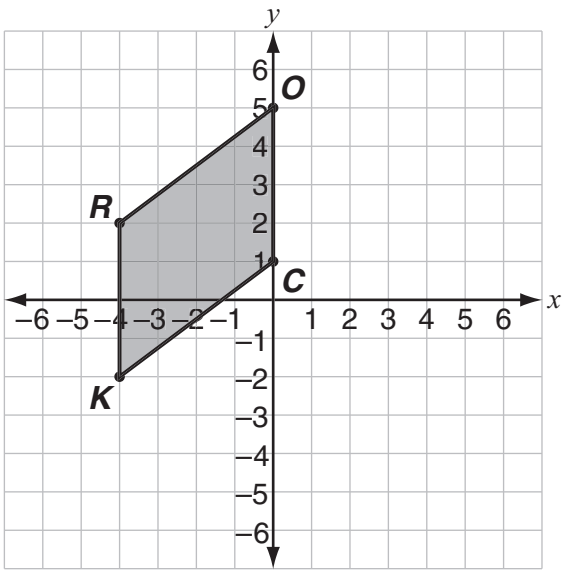
Please STOP. Do not go on to the next page.

Mathematics
Session 2 (Calculator)

This test session includes multiple-choice questions. You may use a calculator during this session.

Mark your answers in the section marked "Mathematics—Session 2 (Calculator)" in your Student Response Booklet.

24. Parallelogram $ROCK$ is on the coordinate grid below.



The perimeter of parallelogram $ROCK$ is 18 units. What is the length of $\overline{RO}$?

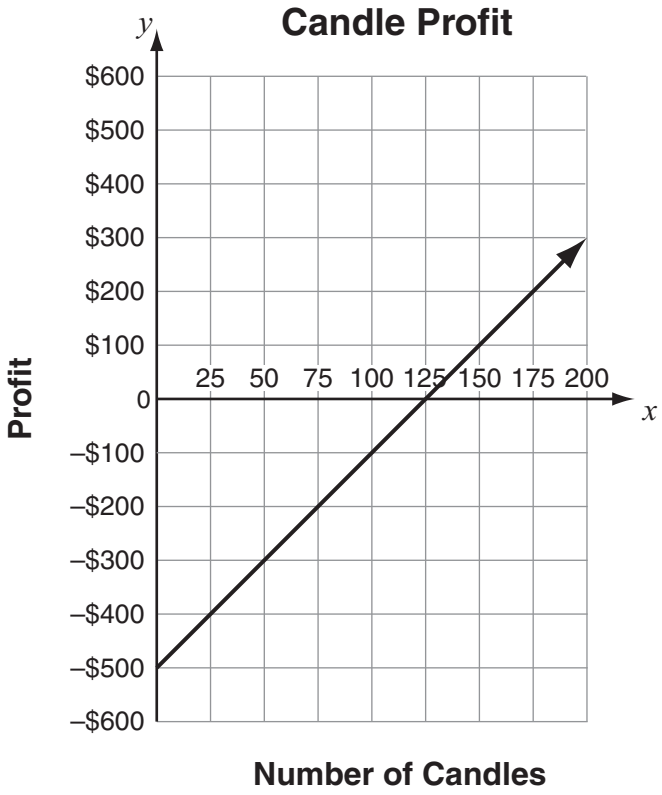
A. 4 units

B. 5 units

C. 8 units

D. 10 units

25. The school choir is selling candles to raise money. The director made this graph to show the amount of profit earned for selling different numbers of candles.



Which equation represents this graph?

A. $y = 500 - 4x$

B. $y = 4x - 500$

C. $y = 500 - \frac{1}{4}x$

D. $y = \frac{1}{4}x - 500$

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28. Edward is creating a painting from a photograph that is 6 inches long and 4 inches wide. The length and width of the painting will be proportional to the length and width of the photograph. The painting will be 12 inches wide. What will be the length of the painting?

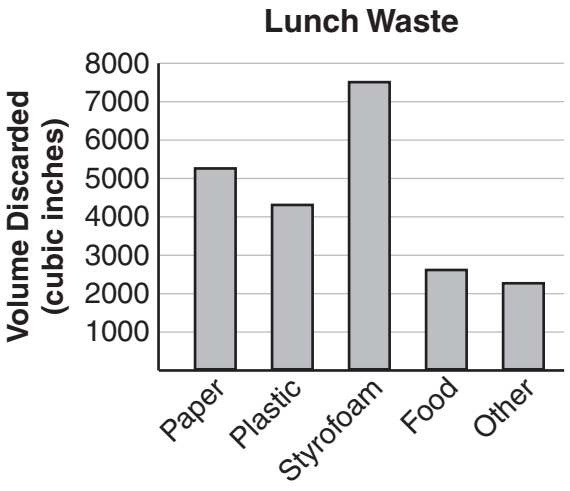
A. 8 inches

B. 14 inches

C. 18 inches

D. 72 inches

30. The graph below shows the lunch waste produced by eighth-grade students at a middle school.



Which conclusion can be made based on the information in the graph?

A. About 20% of the lunch waste is food.

B. About $\frac{1}{3}$ of the lunch waste is Styrofoam.

C. More Styrofoam is discarded than paper and plastic combined.

D. Less plastic is discarded than food.

31. The city transportation commission is conducting a survey to determine riders' opinions about the quality of the public bus system. Which sample population is the **most** appropriate to survey?

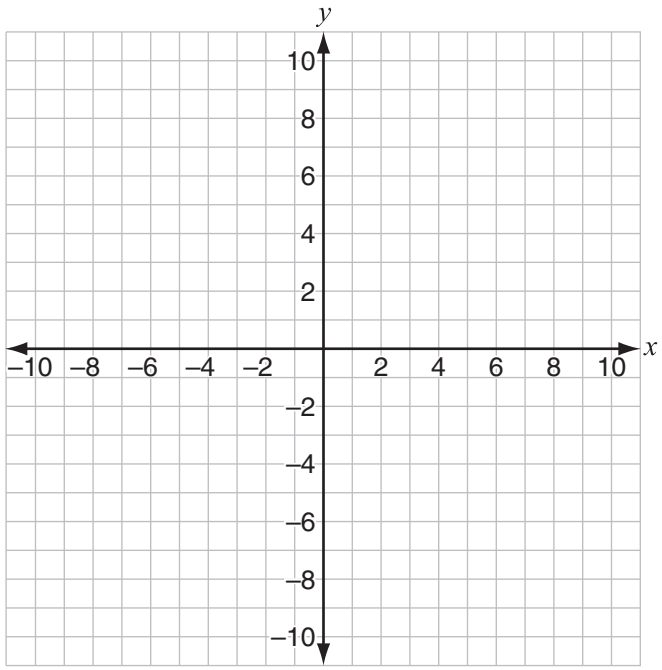
A. the people at one bus stop over a thirty-day period

B. every fifth rider on one bus one day

C. the people at one bus stop one day

D. riders on different buses during a thirty-day period

35. You may use the grid below to answer this question.



Point Q is located at $(4, 6)$. Which transformation of point Q results in an image at $(4, -6)$?

A. a reflection over the y-axis

B. a reflection over the x-axis

C. a 90° clockwise rotation about the origin

D. a 180° rotation about the origin

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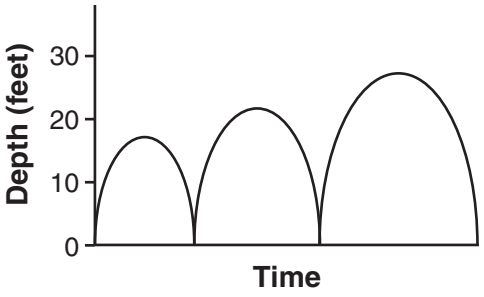
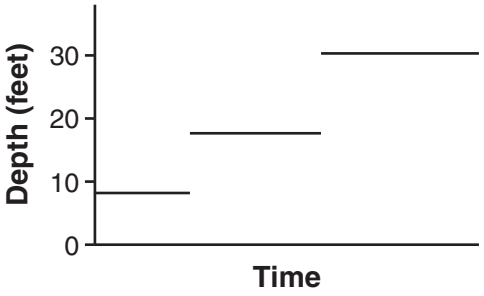
36. Glenda went scuba diving. She dove below the surface of the water three times, coming up to the surface between each dive. Each dive was deeper than the one before. Which graph **best** represents this situation?

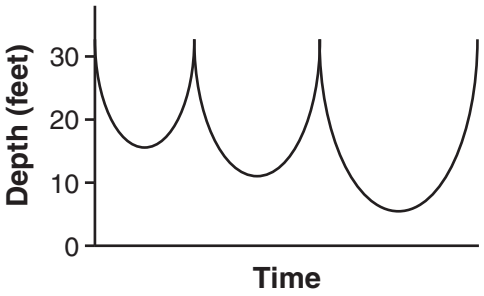
A.



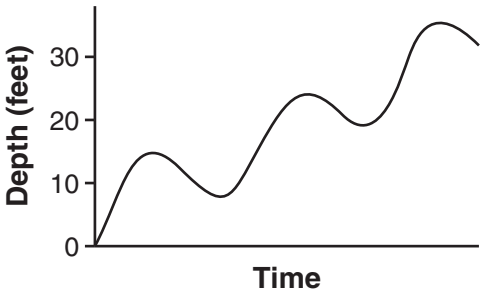
B.



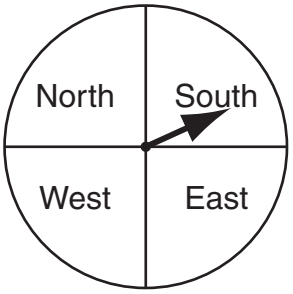
C.

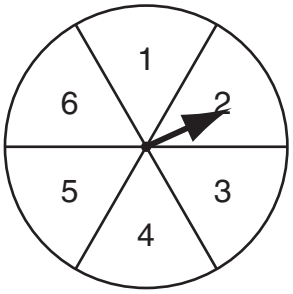


D.



38. Steven's new board game uses the spinners shown below.





Each spinner is spun once. What is the probability the spinners will land on North and 4?

A. $\frac{1}{24}$

B. $\frac{1}{10}$

C. $\frac{1}{6}$

D. $\frac{1}{4}$

41. Values of m and n are defined below.

$$0 < m < 1$$

$$n > 1$$

Which expression is true?

A. $\frac{m}{n} > 1$

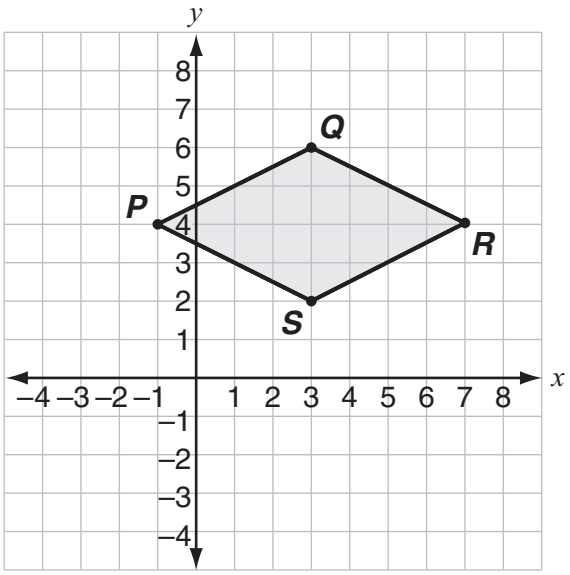
B. $\frac{m}{n} < m$

C. $\frac{m}{n} > n$

D. $\frac{m}{n} < 0$

Please go on to the next page.

42. Rhombus *PQRS* is on the coordinate grid below.



What is the area of the rhombus?

A. 32 square units
B. 24 square units
C. 16 square units
D. 8 square units

43. A 2-inch-long grasshopper can jump 160 inches. If a 6-foot-tall man had the same ratio of height to jump length, how far could he jump?

A. 480 feet
B. 320 feet
C. 27 feet
D. 13 feet

47. The length and width of rectangle *S* are twice those of rectangle *R*. How many times as great is the area of rectangle *S* than the area of rectangle *R*?

A. 2
B. 4
C. 6
D. 8

Please STOP. Do not go on to the next page.

Mathematics
Session 3 (Calculator)

This test session includes multiple-choice questions. You may use a calculator during this session.

Mark your answers in the section marked "Mathematics—Session 3 (Calculator)" in your Student Response Booklet.

49. Fifty students were asked which type of milk they like best. The results are shown in the chart below.

Type of Milk	Number of Students
Chocolate	28
White	22

Based on the chart, if 600 students are asked the same question, how many can be expected to choose chocolate milk?

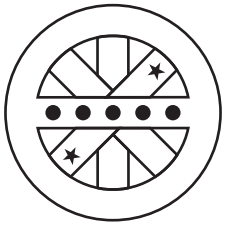
A. 336
B. 300
C. 264
D. 200

50. Jake packed 12 jars of paint in a box. Each jar and its contents weigh 10 ounces. The empty box weighs 1 pound, 14 ounces. What is the total weight of the packed box?

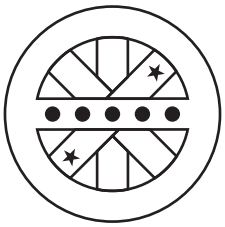
A. 7 pounds, 8 ounces
B. 9 pounds, 2 ounces
C. 9 pounds, 6 ounces
D. 10 pounds, 2 ounces

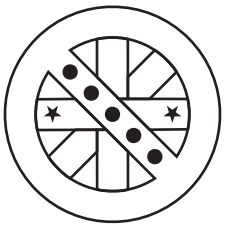
Please go on to the next page.

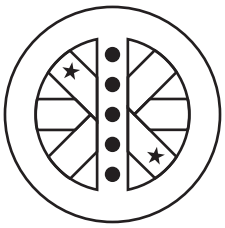
56. Janice created this logo for her bicycle shop.

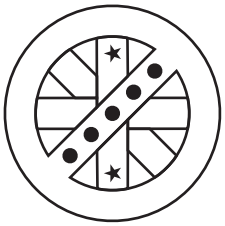


Which figure shows her logo after a 45° clockwise rotation about the center?

A. 

B. 

C. 

D. 

59. Fred drew a triangle. Sam wants to draw a triangle that has a base that is twice as long as the base of Fred's triangle but has the same area. By what amount does Sam need to multiply the height of Fred's triangle?

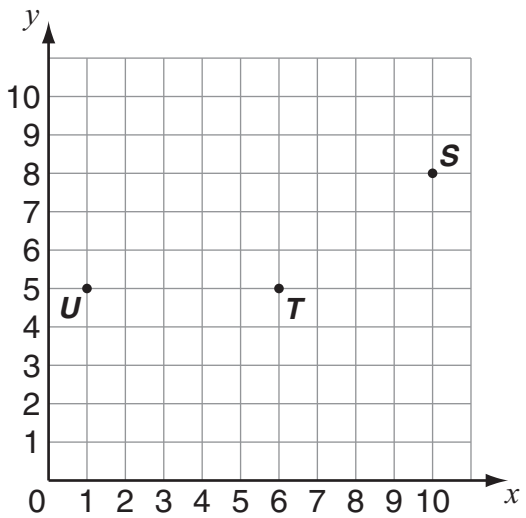
A. $\frac{1}{4}$

B. $\frac{1}{2}$

C. 2

D. 4

61. Three vertices of parallelogram *RSTU* are plotted on this coordinate plane.



Which ordered pair could be the coordinates of point *R*?

A. (4, 9)

B. (5, 8)

C. (6, 8)

D. (1, 8)

Please go on to the next page.

62. The list below shows the purchase prices of four homes sold in a town one week.

\$155,000 \$165,000 \$170,000 \$170,000

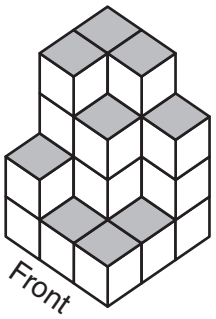
It was later discovered that a fifth home was sold that week for \$450,000. By how much does the **mean** purchase price for that week **increase** with the inclusion of the purchase price of the fifth home?

A. \$ 57,000
B. \$ 165,000
C. \$ 222,000
D. \$ 280,000

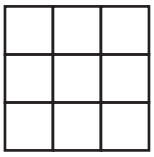
66. At Eagle School, kindergarten enrollment increased from 253 students ten years ago to 312 students this year. The principal is making a bar graph to emphasize that this increase is very large. Which scale and interval would be **best** for the principal to use for the graph?

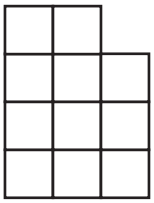
A. scale: 0 to 400; interval: 50
B. scale: 0 to 800; interval: 100
C. scale: 250 to 320; interval: 10
D. scale: 250 to 425; interval: 25

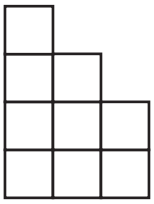
67. The structure shown below is made of cubes.

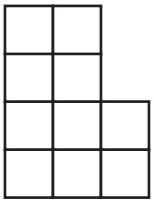


Which diagram shows the left side view of this structure?

A.


B.


C.


D.


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68. Which statement can be true about a quadrilateral?

A. It has four acute angles.

B. It has exactly two right angles.

C. It has exactly three right angles.

D. It has four obtuse angles.

Please STOP. Do not go on to the next page.

Science
Session 1

This test session includes multiple-choice questions and a question for which you must write out your answer. Be sure to answer all parts of the question.

Mark your answers in the section marked "Science—Session 1" in your Student Response Booklet.

1. The table below contains data about changes in heart rate.

Changes in Heart Rate

Body Position	Heart Rate (beats per minute)
Lying	56
Sitting	60
Standing	72

Which conclusion is supported by the data?

A. Heart rate is not affected by the position of the body.
B. Heart rate is greatest when sitting versus lying or standing.
C. Heart rate increases as the body goes from lying to standing.
D. Heart rate decreases as the body goes from lying to standing.

2. Iron chloride is formed when 44 g of iron and 56 g of chlorine react completely. What is the expected mass of iron chloride?

A. 12 g
B. 44 g
C. 56 g
D. 100 g

3. Which change will occur if global temperatures increase and the polar ice caps melt?

A. Coastal cities will be flooded.
B. Land for farming will increase.
C. Crop production will increase.
D. Climates will become cooler.

4. The table below shows the distance a cart travels over time.

Motion of a Cart

Time (s)	Distance (cm)
0	0
1	1
2	4
3	9
4	16
5	25

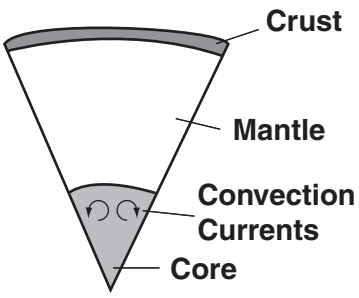
Which evidence suggests that an unbalanced force is acting on this cart?

A. The time intervals are even.
B. The cart's speed is changing.
C. The cart moves more than 20 cm.
D. The distance is recorded in centimeters.

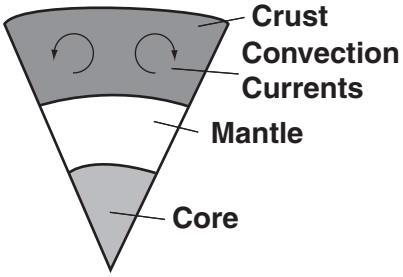
Please go on to the next page.

5. Which model do scientists think **most** closely resembles the structure of Earth's interior?

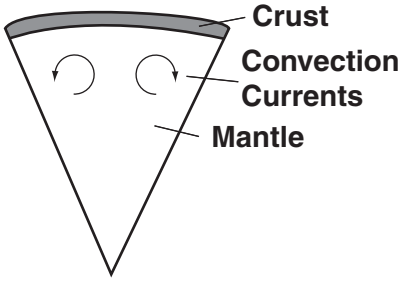
A.



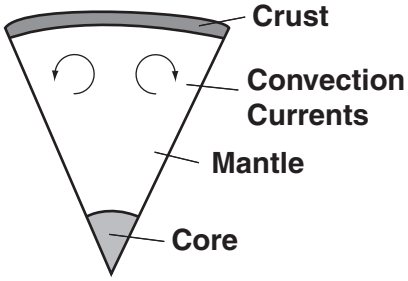
B.



C.



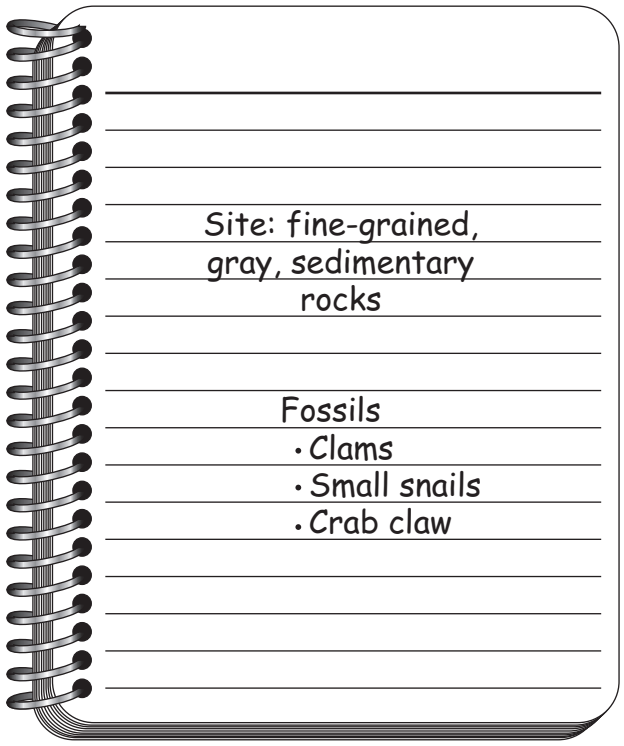
D.



8. Which organisms are decomposers in ecosystems?

A. bacteria and fungi
B. grass and trees
C. mice and rabbits
D. snakes and hawks

9. The notes shown below are related to a past environment in which sedimentary rocks and fossils formed.



Which modern environment is **most** like this past environment?

A. a dune
B. a mountaintop
C. a river bottom
D. a saltwater marsh

Please go on to the next page.

10. Which event is a type of sexual reproduction?

A. the division of regular body cells
B. the laying of eggs on land or in water
C. the production of egg and sperm cells
D. the growth of small buds on the body

11. How is a person able to see an object such as a chair?

A. The eye detects the light reflected off the chair.
B. The eye detects the shadows formed by the chair.
C. The eye detects the light energy produced by the chair.
D. The eye detects the light of the chair's mechanical energy.

15. Which characteristic do scientists use to classify organisms?

A. body structure
B. habitat
C. method of reproduction
D. size

16. Which organisms release oxygen into Earth's atmosphere so other organisms can live on land?

A. fungi
B. insects
C. mammals
D. plants

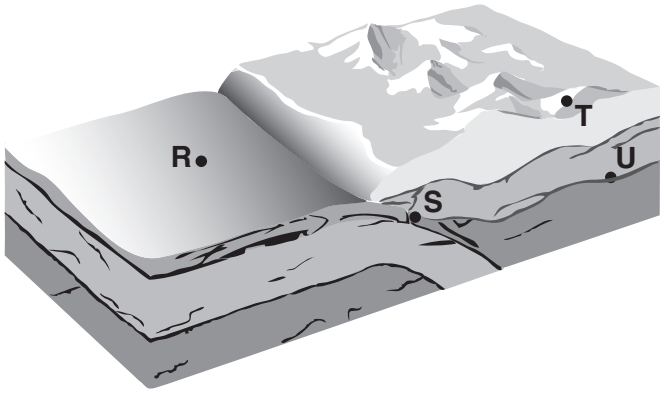
17. A student is designing an investigation with the steps listed below.

- Collect 10 g each of flour, salt, sugar, and baking soda.
- Put 100 mL of water in each of four beakers.
- Add each substance to its own beaker.
- Stir the substance in each beaker for 2 min.

Which question is the student's investigation designed to answer?

A. Which substance is the most dense?
B. Which substances completely dissolve in water after 2 min?
C. How long does it take to dissolve four different substances?
D. How much water does it take to completely dissolve each substance?

18. Study the trench diagram below.

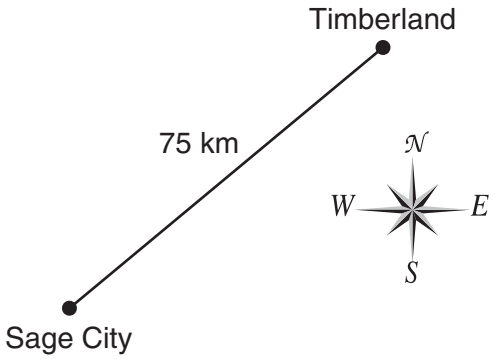


Where is an earthquake **most likely** to occur?

A. location R
B. location S
C. location T
D. location U

Please go on to the next page.

19. A person drives from Sage City to Timberland.



The speedometer reads 100 km/h for the entire 75-km trip. Which statement **best** describes the velocity of the person's car?

A. The person traveled 150 km round trip.
B. The person traveled 75 km during the trip.
C. The person traveled northeast at 100 km/h.
D. The person traveled east and then north at 100 km/h.

23. Many famous sculptures in Italy have been moved inside museums to prevent further damage. Which process **most likely** damaged the sculptures?

A. increasing mud from traffic
B. acid rain
C. decreasing ozone
D. increasing air temperatures

24. Study the food chain below.

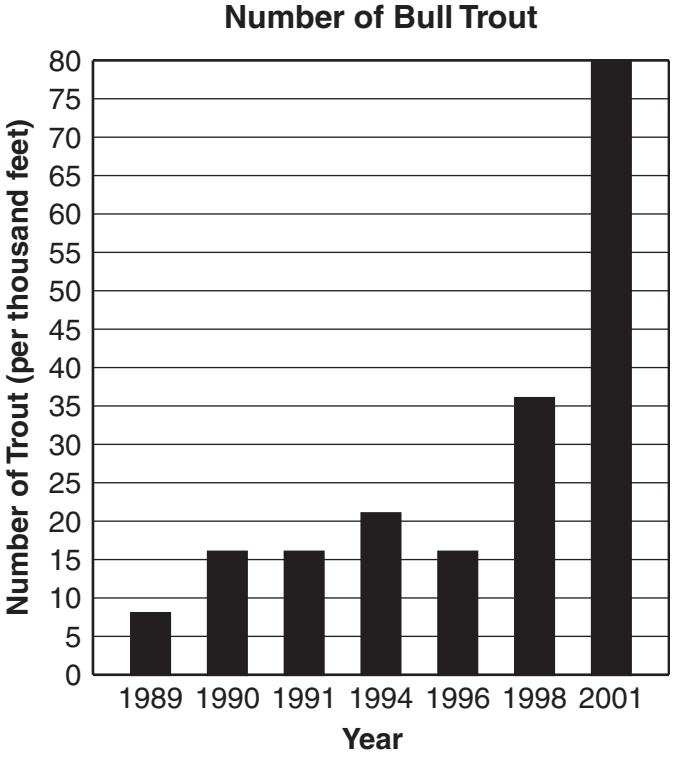
algae ⟶ mosquito ⟶ fish

What is the source of energy for the organisms in this aquatic food chain?

A. oxygen
B. sand
C. sunlight
D. water

Please go on to the next page.

25. In 1993, the governor of Montana appointed a team to revive bull-trout populations in state rivers. The graph below shows the number of bull trout counted per 1000 feet in the Blackfoot River at several different times from 1989 through 2001.



Was the team successful in reviving the bull-trout population?

A. no, because bull-trout numbers increased too rapidly

B. no, because the bull-trout population density decreased in 1996

C. yes, because the bull-trout population density has greatly increased since the project began

D. yes, because bull trout have displaced other native species since the project began

26. Which body structure is matched to its proper level of biological organization?

A. the blood—organ

B. the brain—tissue

C. a liver—tissue

D. a lung—organ

Please go on to the next page.

Write your answer in the space provided for it in your Student Response Booklet.

27. Students want to give weather reports at their school.
    a. List **three** instruments the students could use to describe or predict the weather.
    b. Describe how the students could use these instruments to find out about the weather.

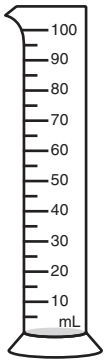
Please STOP. Do not go on to the next page.

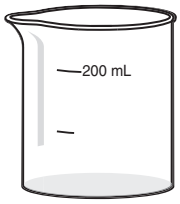
Science
Session 2

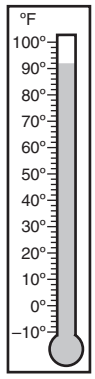
This test session includes multiple-choice questions.

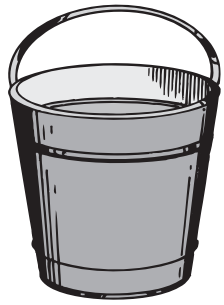
Mark your answers in the section marked "Science—Session 2" in your Student Response Booklet.

28. Which tool should be used to accurately measure 100 mL of water for an investigation?

A. 

B. 

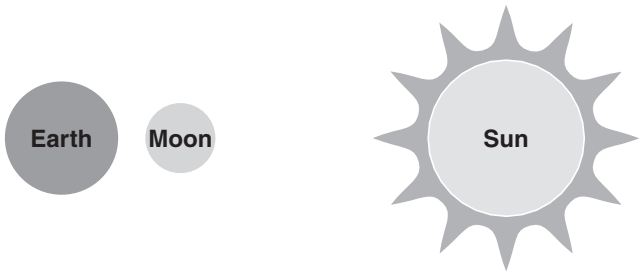
C. 

D. 

29. Which example is a chemical reaction that involves oxygen?

A. a sponge absorbing water
B. a sugar cube dissolving in water
C. a black can warming in the Sun
D. a car rusting when exposed to air

30. Study the diagram below.



Which phase of the Moon does this diagram model?

A. crescent moon
B. full moon
C. gibbous moon
D. new moon

Please go on to the next page.

31. Which part of a cell directs its functioning?

A. its cell membrane
B. its cytoplasm
C. its nucleus
D. its vacuole

35. A student makes an incorrect statement by saying, "All matter on Earth is made from three elements: carbon, hydrogen, and oxygen." Which statement about all matter on Earth is correct?

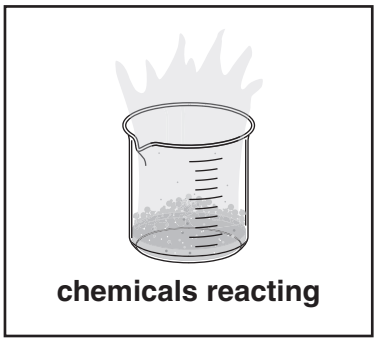
A. "All matter on Earth is made from elements from the Sun."
B. "All matter on Earth is made from about 100 elements."
C. "All matter on Earth is made from elements from the Moon."
D. "All matter on Earth is made from 5 elements."

36. When an environment changes, species must be able to adapt to the new conditions. What is the likely result if a species **cannot** adapt?

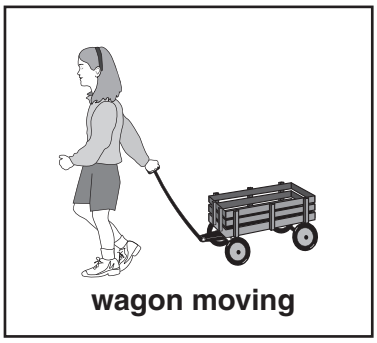
A. The species will become extinct.
B. The species will go into hibernation.
C. The species will modify the conditions.
D. The species will produce a new species.

37. Which picture shows an example of a change in gravitational energy?

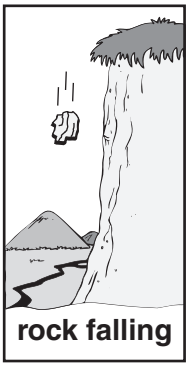
A.



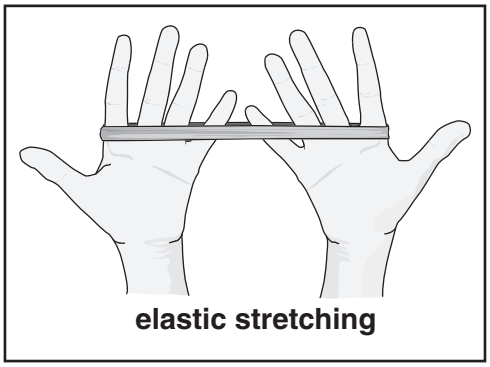
B.



C.



D.



Please go on to the next page.

38. Study this map of Texas.

San Antonio and Galveston are at the same latitude. Why are the average temperatures in Galveston warmer than the average temperatures in San Antonio?

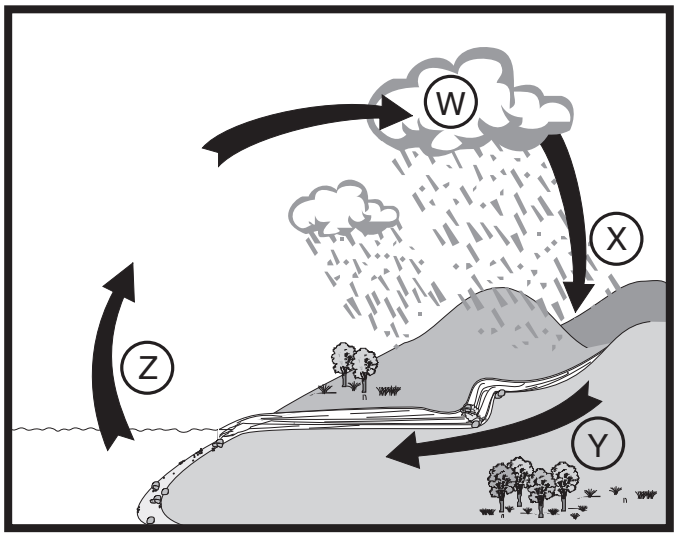
A. Galveston has a different longitude than San Antonio.

B. Water holds heat longer than land, and Galveston is closer to a large body of water.

C. Pavement holds heat, and San Antonio has more pavement because it is a larger city.

D. San Antonio is in a hilly part of Texas, and the hills reflect heat into the atmosphere.

42. Study the water cycle diagram below.



What is happening at location Z in this water cycle diagram?

A. condensation

B. evaporation

C. runoff

D. precipitation

43. Read the information below.

Soil Description

- is dark brown to black
- has worms
- is moist
- has decayed roots
- has a fine texture

Through which process did this soil **most likely** form?

A. melted rocks and plants mixing

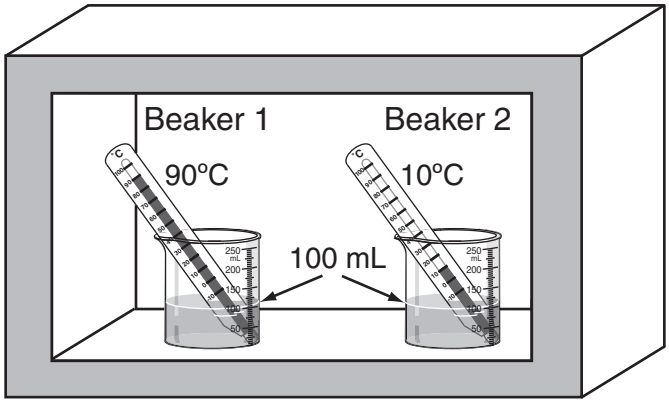
B. beach sand and plants sticking together

C. rocks and plant remains breaking down

D. fossils of old plants and insects being protected

Please go on to the next page.

44. A student places two identical beakers of water in an insulated box. The water in each beaker is a different temperature, as shown below.



Insulated box

Which statement **best** predicts the water temperatures four hours later?

A. The water in Beaker 1 will be 100°C and the water in Beaker 2 will be 0°C.

B. The water in Beaker 1 will be 50°C and the water in Beaker 2 will be 50°C.

C. The water in Beaker 1 will be 10°C and the water in Beaker 2 will be 90°C.

D. The water in Beaker 1 will be 90°C and the water in Beaker 2 will be 10°C.

45. Sunlight contains visible light, infrared radiation, and ultraviolet radiation.

How are these parts of sunlight different from one another?

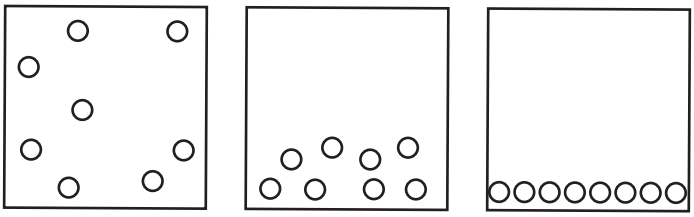
A. They are different colors.

B. They travel through space at different speeds.

C. They have different wavelengths.

D. They take different paths to reach Earth.

46. Each model below represents the particles of matter in a closed container.



Model A **Model B** **Model C**

Which sequence shows the diagrams ordered from having the most energy to having the least energy?

A. Model A, Model B, Model C

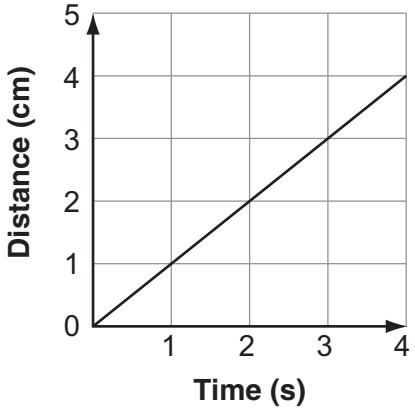
B. Model A, Model C, Model B

C. Model C, Model B, Model A

D. Model C, Model A, Model B

Please go on to the next page.

50. An eighth-grade science class is studying the motion of objects. One student in the class made the graph shown below.

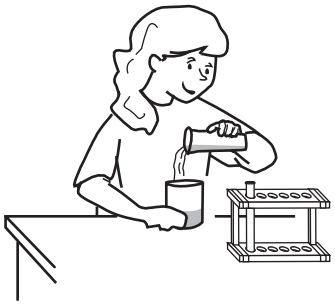


Which title **best** fits this graph?

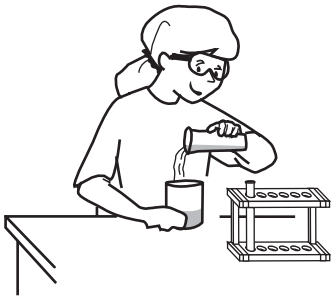
A. An Object at Rest
B. An Object Moving Backward
C. An Object Increasing Speed
D. An Object Moving at a Constant Speed

51. Sally is mixing two liquids in a science investigation. Which picture shows the safest way for Sally to mix the liquids?

A.



B.



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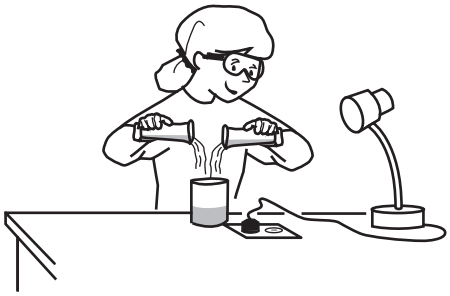

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52. Louis Pasteur is credited with developing the germ theory of disease, but many scientists had proposed the idea before Pasteur did. Which statement explains why the scientific community accepted the theory when Pasteur proposed it but did not previously accept it?

A. Pasteur controlled many unrelated variables.

B. Pasteur gained the approval of the government.

C. Pasteur provided evidence to support the theory.

D. Pasteur used publicity to tell people about his theory.

53. Which question can be **most** easily answered by doing a scientific experiment?

A. Where is the tallest tree in the world?

B. What is the average lifespan of humans?

C. Why do humans dream while they are asleep?

D. How does heart rate change when a person exercises?

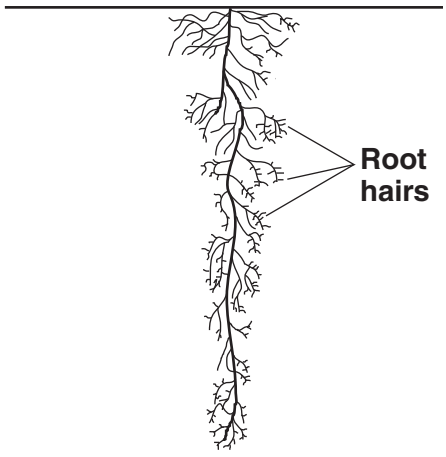
Please STOP. Do not go on to the next page.

Science
Session 3

This test session includes multiple-choice questions and a question for which you must write out your answer. Be sure to answer all parts of the question.

Mark your answers in the section marked "Science—Session 3" in your Student Response Booklet.

55. The picture below shows a plant root.



Which sentence **best** explains how the hairs on the root are helpful to the plant?

A. The hairs protect the root from drying out or rotting.

B. The hairs stop animals from digging up and eating the root.

C. The hairs keep other plants' roots from entering that soil space.

D. The hairs increase the root's absorption of water and nutrients.

56. A student has dissolved salt in water. Based on the properties of salt and water, which method should be used to separate the mixture?

A. cooling the mixture

B. evaporating the water

C. filtering the mixture

D. letting the salt settle out

57. During a hot, dry month, which water cycle process happens **most** often?

A. runoff

B. rainfall

C. gas changing to liquid

D. liquid changing to gas

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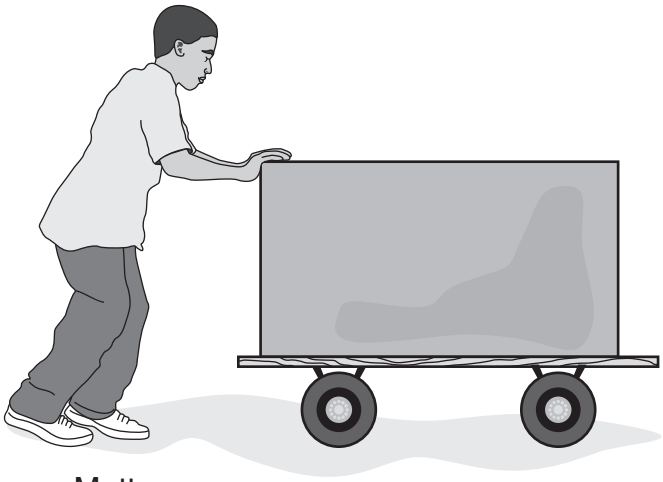
58. Matt is pushing a large box on rollers across a floor, as shown below.



Matt

What will happen to the box's motion if another person joins Matt and pushes in the same direction and with the same strength as Matt is pushing?

A. The box will speed up.
B. The box will move in a circle.
C. The box will change direction.
D. The box will move at a constant speed.

59. A student's research shows that the gases helium, neon, and argon almost never combine with other elements. Based on this information, which statement is the **best** conclusion about helium, neon, and argon?

A. These elements are the same color.
B. These elements have the same mass.
C. These elements have similar chemical properties.
D. These elements are found in large amounts in nature.

62. What was the **most** important theory in helping people understand the structure of Earth?

A. The surface of Earth is made of plates that move.
B. Glaciers shaped many of the mountains found in Montana.
C. Dinosaurs became extinct when a comet collided with Earth.
D. Ancient seas once covered many places that are now dry land.

63. Janet is making a scale model of the solar system. Some of her data are shown in the table below.

Planetary Data

Planet	Average Distance from the Sun (millions of km)
Mercury	57.9
Venus	108.2
Mars	227.9
Jupiter	778.3

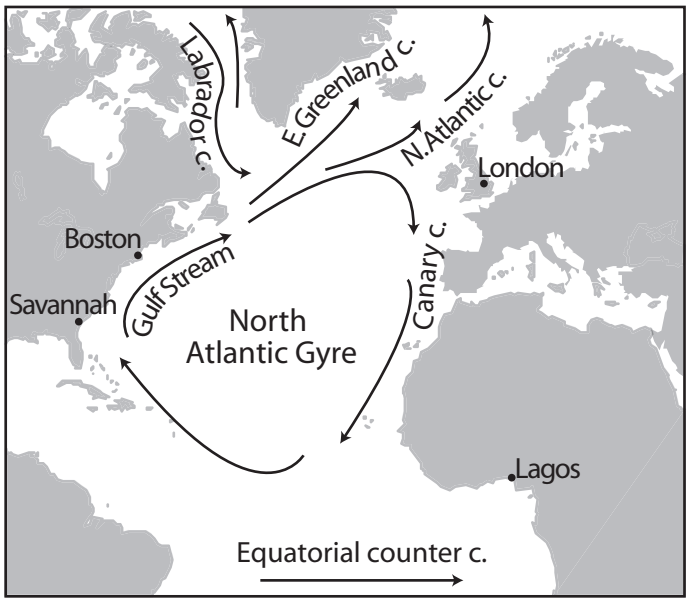
In her model, Mercury is 5.8 centimeters from the Sun. How far from the Sun should Janet put Venus, Mars, and Jupiter?

A. Venus: 1.1 centimeters,
Mars: 2.3 centimeters,
Jupiter: 7.8 centimeters
B. Venus: 11 centimeters,
Mars: 23 centimeters,
Jupiter: 78 centimeters
C. Venus: 108 centimeters,
Mars: 228 centimeters,
Jupiter: 778 centimeters
D. Venus: 110 centimeters,
Mars: 230 centimeters,
Jupiter: 780 centimeters

Please go on to the next page.

64. The map below shows currents in the Atlantic Ocean.

Atlantic Ocean Currents



Which shipping route could be faster with assistance from the currents in the Atlantic Ocean?

A. Boston to Savannah
B. Lagos to London
C. London to Boston
D. Savannah to London

65. Where are genes located in pea plants?

A. in the cell membrane
B. in the chromosomes
C. in the cytoplasm
D. in the roots

69. What happens as a result of increased cloudiness in the atmosphere?

A. The rate of photosynthesis increases.
B. The number of people with skin cancers increases.
C. Less solar energy is reflected before reaching Earth.
D. Heat energy from Earth is reflected back to Earth.

70. A veterinary student wants to produce new cattle. Which class should she take to **best** learn how to produce strong, healthy cattle?

A. Bacteriology
B. Genetics
C. Toxicology
D. Virology

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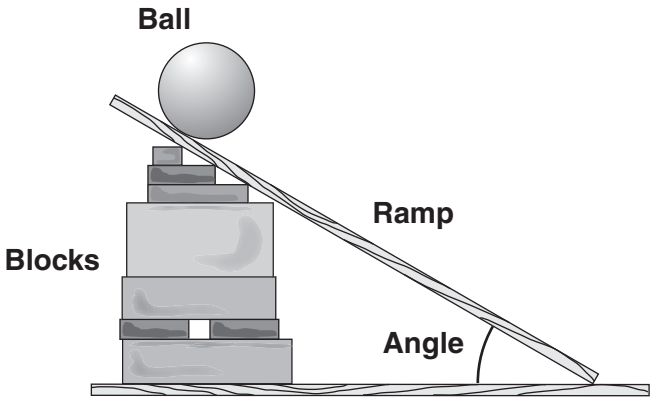
71. A student is investigating the question, "How does the mass of a ball affect its speed rolling down a ramp?" A diagram of her investigation is below.



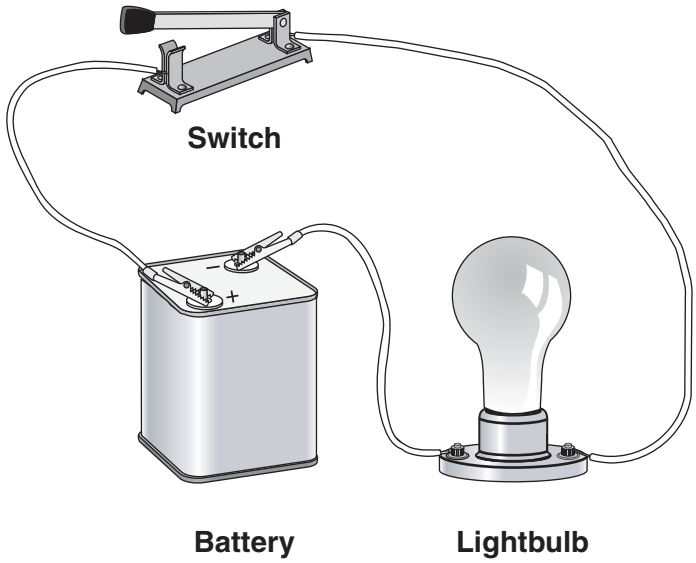
The student collects and records data in the table shown below.

Trial	Angle of Ramp (°)	Mass of Ball (g)	Time to Roll Down Ramp (s)
1	10	5	4.2
2	20	10	3.9
3	30	15	2.2
4	40	20	2.1

The student concludes that the mass of the ball changes the speed of the ball. What does she need to do to improve the design of the investigation?

A. She should use balls with the same mass.
B. She should measure the length of the ramp.
C. She needs to keep the angle of the ramp constant.
D. She needs to time the ball to the nearest hundredth of a second.

72. Study the electrical circuit shown below.



What is the energy sequence of this circuit?

A. electrical energy → chemical energy → light energy
B. light energy → electrical energy → chemical energy
C. chemical energy → electrical energy → light energy
D. chemical energy → light energy → electrical energy

73. Paleontologist Jack Horner found fossils of five *Tyrannosaurus rex* dinosaurs grouped together. He said this was evidence that *T. rex* was a scavenger. Many paleontologists had believed *T. rex* was a predator.

Which way would be **best** for Horner to share his new evidence and hypothesis with other paleontologists?

A. publishing an article in a scientific journal
B. making a speech to the United States Senate
C. debating with another paleontologist on a radio show
D. appearing on television shows with pictures of his discovery

Please go on to the next page.

77. A student is investigating how fast a chemical reaction occurs. The reaction happens when two solutions are poured into the same container. The table below shows the student's data.

Speed of a Reaction

Trial	Amount of Each Solution (mL)	Temperature (°C)	Time to Completely React (min)
1	100	21	7
2	100	26	3
3	100	16	10

Based on the data, which change makes the chemical reaction occur faster?

A. increasing the amount of each solution
B. decreasing the amount of each solution
C. increasing the temperature
D. decreasing the temperature

Please go on to the next page.

78. A student wants to know if temperature affects the rate of decomposition. She plans to bury leaves in three containers full of soil. She will then place one container near a heater, one in a refrigerator, and one in a location at room temperature. She will uncover the leaves each week to see how much they have decomposed.

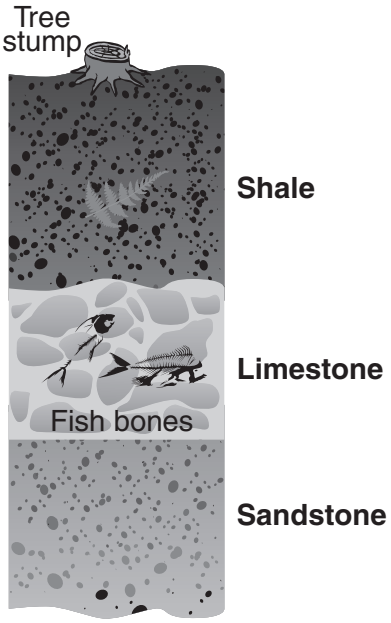
What else should the student do to carry out this investigation?

A. add earthworms to one of the containers
B. put a lid on only the container in the refrigerator
C. use the same kind of soil in each container
D. have a different type of leaf in each container

79. Many species of fish are dying in a local pond. Scientists think that global warming is increasing the temperature of the pond. Which tool should the scientists use to investigate their hypothesis?

A. a barometer
B. pH paper
C. a ruler
D. a thermometer

80. The diagram below represents rock layers at a specific location.



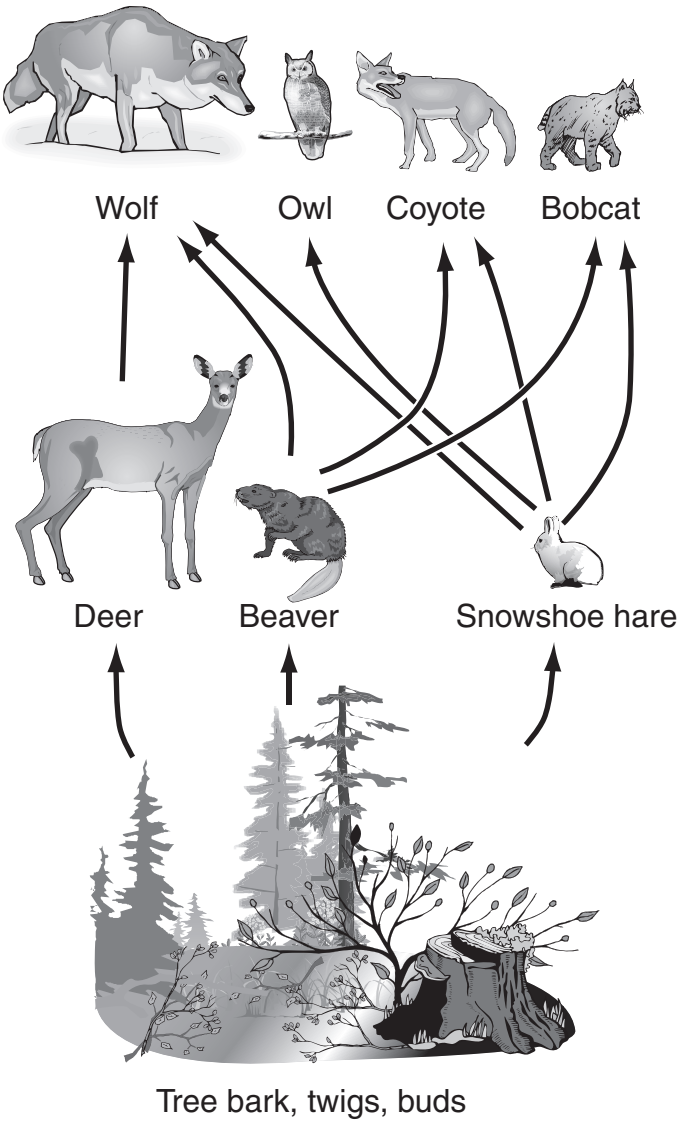
Based on these rock layers, which sequence of environments, from bottom to top, **most likely** existed at this location?

A. forest → beach → deep ocean → beach
B. beach → deep ocean → marsh → forest
C. grassland → marsh → beach → deep ocean
D. deep ocean → beach → marsh → grassland

Please go on to the next page.

Write your answer in the space provided for it in your Student Response Booklet.

81. Study the food web below.



Suppose that the number of deer in this ecosystem decreases significantly one fall. Discuss **three** different effects this decrease might have on other organisms in the food web.

Please STOP. STOP

Acknowledgments

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